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### Title

Parolees' physical closeness to health service providers: a study of California parolees.

### Permalink

<https://escholarship.org/uc/item/3qq959gs>

### Journal

Health & place, 15(3)

### ISSN

1353-8292

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### Publication Date

2009-09-01

### DOI

10.1016/j.healthplace.2008.10.006

Peer reviewed

**Parolees' physical closeness to health service providers: A study of California Parolees**

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October 24, 2008

*Post-print. Published in Health & Place 2009 15(3): 679-688*

Word count: 8,786

Running Head: "Parolees' access to health services"

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*Acknowledgements:* We thank the Center for Evidence Based Corrections at the University of California, Irvine for providing access to the data used in the analyses.

**Parolees' physical closeness to health services: A study of California Parolees**

**Abstract**

We studied a sample of parolees and health service providers in the state of California in 2005-06 to examine the relative physical closeness to health providers (and the potential demand of these providers) of parolees based on their demographic and prior offending characteristics. Although African-American and Latino parolees have more health providers nearby, these providers have considerably more potential demand. The health providers near long-term prisoners and sex offenders have more potential demand. The results suggest inequity in access to services, as minority parolees and those with greater needs may live near more impacted providers. The results also suggest some differences in access based on rural, suburban, or urban location.

**Keywords:** parolees, health services, neighborhoods, propinquity.

### **Bios**

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### **Parolees' physical closeness to health services: A study of California Parolees**

Given the large increase in imprisonment rates over the last 25 years (1, 2), there has been a corresponding increase in the number of offenders returning to communities from prison. The number of offenders returning annually from prison to U.S. neighborhoods increased from 170,000 in 1980 to about 700,000 in 2005 (1, 3), and there were 4.3 million ex-offenders living in neighborhoods in 2000 (4). Prisoners returning to their communities often have serious problems with substance abuse, mental health, family conflict, homelessness, and lack strong social networks of support (5, 6). These problems frequently result in difficulties for returned offenders in obtaining employment and stable housing, and desisting from criminal behavior. If offenders are returning to neighborhoods that do not provide access to the sort of services that are important for reintegrating them into the broader community, it stands to reason that they will be less likely to succeed in their post-release transition and more likely to recidivate.

Access to health services is crucial for parolees given that they represent a population with particularly acute health needs. For instance, studies have shown that inmates often have 6-10 times higher rates of HIV, 3-17 times higher rates of tuberculosis, 11 times higher rates of gonorrhea, and 9-10 times higher rates of Hepatitis-C (for a summary of these studies, see 7, 8). The rate of TB disease among the imprisoned population is four times that of the general population (9), and Hepatitis C is a leading cause of illness and death among inmates (10). Although the prevalence of HIV/AIDS in prison populations declined steadily from 1999 to 2005, the estimated rate of AIDS in state and federal prisons was still 2.5 times higher than in the general population in 2005 (11). A National Commission on Correctional Health Care study on the health status of soon-to-be-released inmates described the disproportionate prevalence of infectious diseases (HIV/AIDS, hepatitis B and C, tuberculosis), chronic health conditions

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(hypertension, diabetes and asthma) and mental illness in the prison inmate population (12). As a consequence, in 1997 between 20 and 26% of persons in the U.S. with HIV passed through a correctional facility (13). Studies have found that most inmates do not receive treatment or care while incarcerated (7, 8, 14), and the likelihood of treatment decreases further upon release (14). Furthermore, a study of recently released prisoners found that the majority of ex-offenders (8 of 10 men and 9 of 10 women) had a chronic health condition, with a large number of these individuals having co-occurring substance abuse, mental health, and physical health conditions (14). One study concluded that inmates are older in terms of health issues compared to similarly aged non-inmates (15). Despite these documented needs, it is uncertain the extent to which such services are available to reentering offenders (16).

Accessing health services after release from prison is also necessary for the successful integration of most, if not all, offenders released from prison. General health issues are important for accessing jobs, which are important for reintegration. Health problems can interfere with job performance and attendance, leading to job dislocation if unaddressed. For instance, one study found that returning prisoners with physical health conditions had more difficulty finding housing, and about one third had problems severe enough to impact working or other activities (14: 24-25). As a consequence, ex-offenders with physical health conditions had less employment success in the first year of release (14: 25). Curtailing substance use is also important for reintegration as it can affect job performance or lead to additional criminal behavior (14: 54). And parolees with mental illnesses are more likely to become homeless and less likely to be employed (14: 37-38).

Attending programs and receiving services can alleviate these health problems. More frequent attendance in a sexual risk-reduction program reduced sexually risky behavior by

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parolees (17). Post-release attendance in community-based substance abuse programs is associated with less substance use and reduced recidivism (18-20). Program evaluation evidence suggests that community employment programs reduce recidivism (21). Zhang, Roberts and Callanan (22) found that meeting the service goal of one of the constituent programs of California's Preventing Parolee Crime Program (PPCP) was associated with about 15 percent lower recidivism rates, and that parolees who participated in multiple programs had even better outcomes.<sup>1</sup> The fact that only about 40 percent of the parolees in this same study met at least one of these program goals highlights the possible importance of nearby service providers for bringing about sustained involvement on the part of recipients.

These health services can only help parolees reintegrate into the community if parolees actually *access* these services, and there is evidence from other populations that physical closeness to services is crucial for increasing such access. In the behavioral model of health care access, location of services near populations in need is an important enabling resource, interacting with predisposing service-seeking characteristics and need (both perceived and assessed) to produce the likelihood that individuals will access services (23). The presence of nearby providers may well increase awareness of the existence of proximate services, and allows devoting less time and fewer resources to accessing the services. Multiple studies have provided support for the proposition that proximity to health care services results in increased service utilization (24-27). Qualitative work on the dynamics of prisoner reentry have found that lack of access to transportation (28, 29) and lack of information regarding the existence of service providers (29, 30) deter ex-offenders from accessing services. Given this evidence, it seems plausible that physical closeness to providers enables access to these services for parolees.

*Which types of parolees are most in need of health services*

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While the evidence regarding the proximity of returned offenders and services is sparse and somewhat contradictory (31, 32) equally important is the lack of research studying whether access to services varies by *type* of parolees. First, racial/ethnic inequities throughout social life suggest the possibility that parolees may differ in their health service access based on their own race/ethnicity. A large review of the literature found consistent evidence that African-Americans have less access to various medical services than whites (33), that minorities in general have less access to general health care than whites (34), and that the disparity in access to care has increased over the years, particularly for Latinos (35). Even when accounting for income, blacks are less likely than whites to visit their physician for a variety of ailments (for a summary of these results, see 36). And a study found that, among the elderly, African-Americans were three times more likely to have an unmet need compared to whites (37). This suggests our first research question:

*RQ1: Are African-American and Latino parolees near fewer health service providers, or more impacted providers, than white parolees?*

Second, female ex-offenders have service needs that differ significantly from those of male offenders (38). On the one hand, men typically have better health than women; though this will vary across age and social context (39). Indeed, almost 20% more female parolees have general health conditions compared to male parolees, and more than twice as many have mental health conditions (14: 12). On the other hand, several studies have shown that women are more likely to have health insurance and utilize health care than men (40-42), even among parolees (14: 23). For instance, one study found that women are less likely to see a physician if they are poor (43). Among the elderly, females had more problems accessing care than did males (37). This suggests our second research question:



*RQ2: Given their greater needs and access, are female parolees near more health services than males?*

Finally, the evidence that criminal history, in terms of both severity of the most recent offense and the extent of prior criminal activity, is a key determinant of the degree of recidivism risk of a given offender (44), suggests that this population's access to services is essential. Of particular concern are sex offenders, given their treatment needs specific to their offenses, and their residency restrictions that likely impact their proximity to services. This is particularly the case in California after the passage in 2006 of Proposition 83 in California (popularly known as "Jessica's Law"): the residency restriction component of this law increases residence prohibitions in large portions of many California urban areas for sex offenders (45). Although these residence restrictions do not, of course, explicitly limit access to neighborhoods with service providers, to the extent that such residency restrictions in fact limit the access to services of this particular population, this would suggest a rather undesirable unintended consequence of such laws. Despite the importance of these questions given the large increase in incarceration of the last 20 years, answers based on empirical evidence are lacking. This suggests our final research questions:

*RQ3: Are violent and cherner parolees near more health services, and less impacted providers?*

*RQ4: Are sex offenders near fewer health services, and near more impacted providers?*

We address these four research questions examining the physical closeness of of parolees to health service providers. Our analyses take advantage of a unique dataset that combines California parolees and health providers and incorporate GIS coding of both parolee and service provider addresses. Prior research has not been able to directly address these questions due to data limitations and methodological challenges. We describe the data and our research methods in the next section.

## **Data and Methodology**

### *Data*

To address these research questions, we created a unique dataset that combines information on parolees in the state of California in 2005 and 2006 with information on mental health services, general health services, and substance use services geared towards these returning parolees. Although our data were limited to two recent years, limiting our ability to generalize the findings to other points in time, the recency of the data provides important evidence on the current status of parolees' access to health services. The data on parolees were obtained from the California Department of Corrections and Rehabilitation (CDCR). Due to California's determinant sentencing laws, parolees account for nearly all releases from prison. In 2006, only 1,994 of 129,811 felons (1.5%) released from state prison were not released to parole supervision (46). These data provide information on all parolees during the time period, the dates of entry to and exit from a CDCR institution, and certain characteristics of the parolees. We only used the first known address of the parolee upon release from prison given concerns that in subsequent moves parolees may choose to move into neighborhoods with more health service providers, suggesting endogeneity. We therefore have information on 57,107 parolees released in either 2005 or 2006 for which we were able to geocode their address. We merged this dataset with another dataset from CDCR listing the effective dates of all known addresses for parolees. We geocoded the parolee's first address during this time period and placed them at a specific latitude-longitude point. Addresses were geocoded with a success rate of over 80 percent for both parolees and service providers. We acknowledge that we are limited to studying parolees and health service providers from one state, California, and the findings may not generalize to other states. Replications in other states would increase confidence in the findings.

*Outcome measures*

The data on health services available to parolees comes from California Department of Corrections provider database. While this dataset is not exhaustive of all service providers available in California, the fact that it was constructed for parole agents to guide parolees towards services suggests that it captures the most important service providers. It is these providers to which parolees will be made aware. The provider database is maintained by the Division of Adult Parole Operations of the California Department of Corrections and Rehabilitation. Entries into the database are made by Community Resource Managers assigned to parole units across the state, who function as social workers and are responsible for developing a catalog of local resources for parolees. Resources range from housing to anger management to drug and alcohol services—basically all services that parolees may need during their supervision.

At the point of our study, the database contained information on 7,139 providers, of which 3,033 provided one or more types of health-related services. Thus, 1,394 provided substance use services, 2,133 provided mental health services, and 985 provided general health services. The CDCR is currently working on standardizing the process by which providers are added to the database in the individual counties across the state. Both governmental and non-profit community-based providers are included; programs may service other populations as well as correctional populations. For example, county behavioral health departments are included as well as local hospitals and faith-based organizations. Community-based organizations that serve as contractors for the state's parolee alcohol and drug network but who also serve other non-parolee clients are included. The database includes information on the types of resources

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provided by these organizations (vouchers, free meals, counseling); the forms of acceptable payment (and whether they provide low-cost help), a listing of services provided to children, etc.

We geocoded these organizations based on the address provided and placed them at a specific latitude-longitude point. For each organization, we created three indicators: does it provide mental health services (yes/no), general health services (yes/no), or substance use services (yes/no).<sup>2</sup> Since we are theoretically interested in the availability of services to parolees, and not the existence of providers, we allowed a service provider to be counted for each type of health service it provides. For instance, if a provider provides both mental health services and substance use services, it would contribute to the total number of each of these type of services near a particular parolee.<sup>3</sup>

For each individual in our sample, we then calculated the number of organizations offering a particular type of health service within two miles of the parolee's current address. While two miles is a somewhat arbitrary figure, it is consistent with the distance used in prior work and one that county social service administrators suggest is important (47, 48). We also estimated our models using a five-mile circle around parolees and found very similar results. We measured this distance "as the crow flies" based on the latitude and longitude of the parolees and the services. While this was a somewhat arduous task, we feel it provides a more precise assessment of the presence of nearby services than an approach that simply counted the number of service providers co-residing in the same census tract.<sup>4</sup> Our outcome measures therefore are the number of organizations providing a particular type of health service located within two miles of the parolee. Table 1 provides the summary statistics for the variables used in the analyses, and highlights that the average number of service providers within two miles of parolees ranges from 1.67 general health providers to 2.74 substance use providers to just over 4 mental health providers. As further description of the neighborhood context to which these

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parolees return, we present in Table A1 in the Appendix some descriptive statistics from the U.S. Census of the tract they return to compared to the county in which they reside. Unsurprisingly, parolees return to relatively impoverished neighborhoods: they return to tracts with 21.6% poverty, on average, compared to the 15.4% rate of the county in which they live. These tracts also have, on average, 10.8% unemployment compared to 7.8% in the county, and 19.4% single parent households compared to 14.5% in the county.

<<<Table 1 about here>>>

Unfortunately, we do not have information on the capacity or utilization levels of the service providers in our study that could be used to directly measure demand. Allard (48) adopted a strategy of estimating what he termed “potential demand”: the number of residents living near each service provider. We employed this proxy for service provider capacity in our analyses by calculating the number of parolees within two miles of a particular provider on the initial date of our study period (January 1 2005). This provides an estimate of the potential demand for a particular service provider, and although not ideal, is the best measure currently available and highlights that measuring the actual capacity levels of these providers and their current demand is crucial for future analyses. We then calculated for each parolee the average potential demand for each type of health provider within two miles of the specific parolee. For instance, for all mental health providers within two miles of a particular parolee, we computed the average potential demand for these providers. While this provides only a rough estimate of the impact of parolee clustering on service access, as service providers may differ on the number of parolees to whom they can provide services at any given time, it does allow an approximation of the differential burden on the service provision environment of parolees returning to California communities. In our sample, the average general health provider has about 43 parolees within two miles. This value is 82 for substance use providers and 117 for mental

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health providers.<sup>5</sup> We natural log transformed these outcomes to reduce the possibility of extreme cases as well as to ease interpretation of the results.<sup>6</sup>

### *Characteristics of parolees*

We took into account several characteristics of parolees to determine their relationship to the number of health services near them. We created measures of the race/ethnicity of the parolee indicating whether the parolee is African-American, Latino, Asian, white, or other race. We created a measure of the age of the parolee at the first date of the address spell. To take into account possible nonlinear effects of age, we also included measures of age squared and age cubed to test their relationship to relative closeness of services.<sup>7</sup> We created an indicator of whether the parolee is female to account for possible gender differences in access to these services.

From parolees' criminal records we computed the number of prior property offenses, the number of prior violent offenses, and the total number of days they have spent in a CDCR institution. By California statute, violent offenses include all murders committed, about 80% of rapes, 50% of assaults, and 40% of robberies committed. Serious offenses include all of the above four violent offenses as a subset, as well as 60% of burglaries and about 95% of arsons (For a complete description of these categories, see pages 44-47 in 49). For each parolee, we also computed the total number of days they have spent in CDCR institutions over their lifetime to capture long-term institutionalization. We also created an indicator of whether the parolee is a sex offender.

### *Methodology*

Given that our main outcome measures are counts of the number of health service providers within a two-mile radius of the parolee, we estimated fixed effects negative binomial

regression models. The negative binomial model treats the outcome measure as a Poisson distribution with an additional parameter with an assumed gamma distribution to account for the overdispersion created by the nonindependence of events. Whereas a simplistic approach would simply compare all parolees, there may be unobserved differences between counties making it inappropriate to compare the number of health providers near parolees living in different counties. One strategy is to account for these differences by including county-level variables capturing important differences over counties and to estimate a multilevel model. A risk with such an approach is that failing to include all relevant county-level covariates will result in biased coefficients at the parolee-level. Given this, and the fact that we are not interested in explaining differences between counties in the present study, a safer approach is to simply condition out *all* unobserved time invariant differences with constant effects between counties through a fixed effects approach. We adopted the fixed effects approach advocated by Allison and Waterman (50), since it appropriately conditions out differences across counties.<sup>8</sup> In this approach we are estimating the following model:

$$(1) \quad y = \alpha + P\beta + \text{COUNTY}\delta$$

where  $y$  is the number of health services within two miles of the parolee,  $\alpha$  is an intercept,  $P$  is the particular characteristic of interest of the parolee that has  $\beta$  effect on the outcome,  $\text{COUNTY}$  is a matrix of  $K-1$  indicators for the  $K$  counties in California,  $\delta$  is a vector of the effects of each of these counties. Note that whereas this strategy of accounting for differences across tracts by including indicator variables results in the 'incidental parameters' problem for logistic regression models, Allison and Waterman (50) highlight that such is not the case in the negative binomial regression model. In this model, we are effectively only comparing parolees with other parolees *living in the same county*. For the model using the potential demand for the providers near a

particular parolee as the outcome measure, we estimated equation 1 adding a disturbance with a normal distribution (an OLS model), given that this is a continuous measure.

We also estimated additional models in which we allowed these effects to differ over urban, suburban, and rural counties. We defined urban counties as those in which at least 80% of the households live in what the U.S. Census defines to be an urban area; suburban counties are those in which between 50 and 80% of households live in urban areas; and rural counties are those in which less than 50% live in urban areas. In these models we included the main effects of the measures from the initial models as well as interactions with indicators of rural and suburban counties (and the indicators of rural and suburban counties). The main effects in this model capture the effects in urban counties (the omitted category). The sum of the main effect and the interaction variable gives the size of the effect in either rural or suburban counties. Note that these estimated effects are identical to those obtained by estimating separate models for each of these three types of counties. An advantage of this full model approach including interaction terms is that we are able to determine statistically significant differences in coefficients across these three types of counties. These models showed a significant improvement in model fit based on a chi square test of the difference in this new model including interactions between the measures from the earlier models and indicators of rural and suburban counties (this is effectively a Chow Test). All analyses were estimated in Stata 9.2. We tested for and found no evidence of multicollinearity problems or outliers in any of these models.<sup>9</sup>

## **Results**

### *Relationship between returning parolees and crime*

We begin by focusing on the relative closeness of various health providers to our sample of parolees. An advantage of the negative binomial regression model is that the exponentiated



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coefficients are easily interpreted as percentage effects on the outcome measure. For instance, the model with the number of substance use providers near parolees as the outcome in Table 2 (column 1) shows that an African-American has 32.1 percent more such providers within two miles, on average, than does a white parolee ( $\exp(.278)=1.321$ ). A Latino parolee has 9.8 percent more substance use service providers within two miles than does a white parolee living in the same county.

<<<Table 2 about here>>>

The general pattern for race/ethnicity is similar across all three of these types of health providers. African-Americans have more nearby providers of all three types: they have 33.1 percent more mental health providers nearby on average than whites and 15.7 percent more general health providers. Latinos also have more providers nearby than whites, though considerably less than African-Americans: they have 11.4 percent more mental nearby health providers than whites, on average, and 15.1 percent more general health providers. The rates are similar for other race parolees.

Turning to the other demographic measures, we see that the effect for females is more modest than the race effects: females generally have about 5 percent more health providers nearby than do males, though this effect only reaches statistical significance for the presence of substance use providers. The effects of age are somewhat stronger and show a slight initial dip during the early twenties, and then a steady increase that reverses around age 60. For instance, a 50 year old parolee is near about 24 percent more substance use providers than is a 25 year old parolee, holding all other variables in the model to their mean values. The effect of age on the other types of health service providers is generally similar.

We see consistent evidence that parolees who have spent long periods of time behind bars have more service providers nearby. For instance, an additional 3.5 years in prison (a one

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standard deviation increase in this sample) increases the number of nearby general health providers 1.6 percent and the number of nearby mental health and substance use providers 2.5 percent. While generally significant, these are rather modest effects. On the other hand, parolees with more property and violent crimes on their criminal record actually have *fewer* substance use and mental health providers nearby. Each additional non-violent crime and each additional violent crime on a parolee's record reduces the number of such nearby health providers about 2 percent. Sex offenders have between 12 and 15.6 percent more of these health providers nearby than non sex offenders.<sup>10</sup>

### *Potential demand of providers*

The final three models of Table 2 attempt to address the question of whether the providers near some parolees experience more average potential demand. There is considerable evidence that the health providers near minorities have more potential demand. Given that the outcome measure in this linear regression model is natural log transformed, we can interpret the coefficients in terms of percentages. Thus, the substance use providers near African-Americans have 79.2 percent more parolees within 2 miles than do the providers near white parolees. Recall that above we showed that an African-American parolee has about 32 percent more substance use providers nearby than a white parolee, suggesting that African-American parolees live clustered in neighborhoods with both many substance use providers but with even more parolees. On average, over these three types of health providers, African-American parolees have 27 percent more providers nearby, but these providers have 65.5 percent more potential demand. The pattern is similar for other minority parolees: Latinos have, on average, 12.1 percent more of these three types of health providers nearby, but these service providers have, on average, 31.7 percent more potential demand. For other races, these percentages are 10.8 percent and 22.5

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percent. Thus, in answer to our first research question, whereas minority parolees live near somewhat more health service providers, those providers have much higher levels of potential demand than those of white parolees.

The providers near older parolees appear to be more impacted based on our measure of potential demand. This relationship for age is similar to that in the model predicting the presence of nearby services. Older parolees appear clustered in neighborhoods that have both more providers and also more parolees, for all three types of health providers. The health providers near female parolees have, on average, about 12 percent more parolees nearby than do the health providers near male parolees. We therefore find in answer to our second research question that although there is minimal evidence that female parolees have more health providers nearby, these health providers have higher levels of potential demand nearby.

There is also evidence that the parolees most in need of these health services live near providers with more potential demand. For instance, the substance use and mental health providers near sex offenders have about 14 percent larger potential demand than those near other parolees. Thus, in response to our fourth research question, although sex offenders appear to live near more health providers, those providers have higher levels of potential demand. For parolees having spent more time in institutions, each additional 3.5 years of time behind bars increases the potential demand of their substance use and mental health providers 6.6 percent, and general health providers 2 percent. On the other hand, although parolees who have more violent or property prior offenses on their records live near fewer of these health providers, these providers have somewhat lower potential demand. We therefore see that for our third research question, the pattern differs for long-term and violent parolees: whereas long-term parolees live near somewhat more health providers that also have more potential demand, violent parolees live near fewer health providers that have somewhat lower levels of potential demand.

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### *Comparing rural, suburban, and urban counties*

Finally, we relax the assumption that these differences between parolees are the same in all counties. While in these next models we are still only comparing parolees living in the same county, we allowed the effects of these coefficients to differ between rural, suburban, and urban counties. That is, we are effectively estimating separate models for rural counties, suburban counties, and urban counties. While many of these effects did not differ over different types of counties, there were three important differences in the models predicting the number of health services nearby: Latinos, African Americans, and sex offenders showed different effects based on the degree of urbanness of the county.

We see that Latinos have more health service providers nearby than whites when they live in rural counties (models A and B in Table 3). Latinos in rural counties have 30.5% more substance use providers nearby than whites in those same counties, but Latinos in urban counties have just 11.9% more nearby than whites, and Latinos in suburban counties have just 3.3% more nearby than whites, as seen in model A of Table 3. The story is generally the same for Latinos regarding mental health providers. African American parolees living either in rural or urban counties appear to have more of these providers nearby than white parolees. In contrast, sex offenders are nearer to more health service providers when they reside in urban counties. Sex offenders have about 10 percent more substance use and mental health services nearby than other parolees if they live in a rural county, about 20 percent more substance use and mental health services nearby than other parolees when living in an urban county, but essentially no more nearby when living in a suburban county.

Turning to the potential demand of the service providers near these parolees, models C and D in Table 3 highlight that the substance use and mental health services near Latinos in rural counties have about 50 percent more parolees near them than do the providers near whites.

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Although this disparity is still relatively large in urban counties (36 to 46 percent), it falls to about 8 percent in suburban counties. African-American parolees in *urban* counties are much more likely to live in areas in which the substance use and mental health services have relatively high potential demand, as seen in models C and D. Whereas the potential demand of the substance use and mental health services near African-Americans in rural and suburban counties is 30 to 40 percent greater than those near whites, the potential demand of these services in urban counties is over 90 percent greater for African-American parolees than it is for white parolees. Finally, sex offenders living in urban counties are near providers who experience particularly high potential demand. Whereas the potential demand of substance use and mental health services near sex offenders is about 9 percent higher than non-sex offenders in rural counties, the providers near sex offenders in urban counties have about 20 percent more parolees nearby.

## Conclusion

Recent scholarship has extensively described and analyzed the increase in prison incarceration over the past 20 years and the potentially important role that health service providers play in re-integrating parolees into society, yet little systematic evidence exists regarding whether parolees live near health service providers. It is crucial to know this, given the literature on other populations suggesting that physical distance plays a large role in determining whether those in need actually utilize services. Our study has utilized a unique dataset to address this question, as well to explore whether certain *types* of parolees live near more service providers.

Asking whether physical closeness to health providers differs systematically based on the characteristics of parolees illuminated important differences. One key finding is that the parolees arguably most in need of services—specifically, those who have served longer periods of

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incarceration in CDCR institutions and those who are sex offenders—tend to live near providers that have more potential demand. To the extent that such providers have limited capacity to serve nearby parolees, sex offenders and parolees who have served longer prison sentences may have difficulty in accessing their services. For sex offenders, this result may occur as a consequence of the geographic constraints placed on them. Such constraints likely push sex offenders into neighborhoods with higher concentrations of other parolees, and hence over-taxed providers. Longer term offenders may encounter the additional challenge of fewer community ties (including ties to such services) compared to other parolees due to having been gone from the neighborhood longer. These considerations suggest that such neighborhoods might be particularly disadvantaged in general. As we lacked a direct measure of provider capacity—but rather simply measured the number of parolees living near such providers—a key question is the accuracy of this proxy. This proxy will be flawed if the health providers located closest to sex offenders and parolees who have served longer prison sentences have systematically greater capacity levels. Although we are aware of no such evidence, this suggests a useful avenue for future research.

We also found evidence that the health providers near minority parolees have more potential demand. Although nonwhite parolees have *more* health service providers near them than do white parolees, these providers also have far more potential demand. Having more services, but not being able to meet the demand may reflect efforts by county and state agencies in targeting resources to where they are needed, but reflect a general lack of resources to provide *enough* services to meet the demand. It appears that the potential parolee demand for these providers' services was about 2.8 times greater than the advantage African Americans and Latinos obtained from living near more providers.<sup>11</sup> Again, this suggests the possibility that health service providers near minority parolees may be overburdened unless such providers have

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systematically greater capacity than the providers near white parolees. The fact that this result was particularly strong for African Americans living in urban counties suggests that these are likely the neighborhoods with the highest levels of concentrated disadvantage, or what Wilson (51) referred to as the truly disadvantaged. Our inability to take into account the social class of the parolees suggests that this finding may in part be due to the relatively disadvantaged economic position of African Americans. Nonetheless, this suggests a policy need to address this inequity through the funding and siting of health providers in these areas. The fact that this potential demand was so high for substance use providers and mental health providers—two types of providers arguably very important for the truly disadvantaged—is of particular concern.

This study provides guidance on areas that may have large populations of parolees relative to the number of providers. For instance, zeroing in on our results that older parolees tend to be near providers with more potential demand, we can determine that Los Angeles and San Diego Counties appear to be particularly impacted in this regard. Among parolees over 50 years of age and living near highly impacted providers (the average potential demand of nearby providers is in the top quartile), fully 45% of them live in Los Angeles County and 17% of them live in San Diego County—disproportionate shares relative to the total parolee population. This may suggest a need to target facilities to such regions.

The serious health needs of returning prisoners present a public health challenge for the communities to which they return. Understanding parolees' relative access to health services can inform current correctional innovations in California, especially as the state incorporates a logic model that considers linkages with community services as part of the reentry phase (52). This suggests the need for a continuum of care from in-prison health services to post-release health service providers, both to prevent former prisoners from using up resources seeking acute care as a result of failing to manage the health problems they had at release, and to prevent the spread of

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infectious diseases such as HIV, hepatitis and TB. Such infectious diseases may form disease clusters, due to the concentrated nature of prisoner reentry in many urban areas (53). In order to develop such a continuum, however, prison systems must do a better job of identifying inmates who have these health conditions, developing relationships with providers of health care services in the communities to which inmates will return, and sharing information with them.

Community health service providers and public health agencies should engage in reciprocal efforts to understand the public health profile of returning prisoners, and begin engaging with them prior to release to increase the likelihood that they will access services in the community.

However, such efforts will have limited impact unless the health service resources available to parolees in the community are sufficient. Although we lacked information on health service provider capacity, the fact that certain segments of the parolee population (minorities, parolees who had served long prison sentences, and sex offenders) were more likely to share proximity to health services with other parolees suggests that such service capacity may be strained in communities in which large numbers of these parolees cluster after release. Research and analysis is necessary to determine whether community health service resources are sufficient to address the needs of returning parolees. Where this is not the case, the enhancement of existing health care services and the creation of new health service capacity is warranted. Understanding where the most parolees with the greatest service needs live is a necessary first step in determining where to locate such providers.



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## Endnotes

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<sup>1</sup> This program focused on service providers supporting the following domains: 1) employment; 2) substance abuse education and recovery; 3) math and literacy skill development; 4) housing. Within each of these domains, the provider set goals for parolees to attain. For instance, a two grade-level improvement in reading and math skills was the goal for the math and literacy skills domain. The substance abuse component goal was completion of a 40-hour education workshop. For employment, the goal was beginning stable full-time employment. The housing domain employed a graduated metric based on the number of days attending workshops.

<sup>2</sup> Under our coding scheme, organizations are classified as providing substance use services if they are listed as providing any of the following: assess level of substance dependency; assess mental health needs associated with substance abuse; attend drunk driver program; identify/avoid high risk situations that led to past substance abuse; develop relapse prevention plan; enroll in non-medical detox; obtain an assessment for referral to an appropriate substance abuse program; address substance abuse through outpatient program. We classified organizations as providing mental health services if they are listed as providing any of the following: enroll in cognitive therapy program; self-help group; assess potential for depression, suicide, and self-harm; refer to mental health for assessment services; enroll in cognitive skills program to more efficiently deal with failure and rejection; batterer's program; anger management classes; obtain psychiatric medication; obtain mental health assessment and referral; apply for mental health case management; apply for inpatient/hospital mental health treatment; apply for mental health outpatient counseling; crisis center; apply for mental health victim advocacy; attend an anger management program; address violent behavior tendencies. We classified organizations as providing general health services if they are listed as providing any of the following: apply for residence at an assisted living/nursing home; auditory impairment (deafness); clinics; dental

services; emergency care/hospital; HIV/Aids; hospice; long term medical care; medication services; optical services; other services for disabled individuals; visual impairment (blindness).

If the organization provided acute care/medical detox services, we classified them both as a substance use and general health service provider.

<sup>3</sup> Unfortunately, we do not know how extensive are the services offered by a particular provider.

That is, an organization may provide simply a single mental health service, or many mental health services. We are unable to distinguish this in our data.

<sup>4</sup> A limitation to simply measuring the co-occurrence of parolees and service providers in the same tract is that parolees living near the boundary of a tract could actually be closer to providers in an adjacent tract than to providers in their own tract.

<sup>5</sup> There is some evidence that parolees tend to cluster into areas in which there are more service providers, and vice versa. For instance, whereas the mean number of parolees within two miles of a substance use provider is 69.4, the substance use providers near the average parolee have 82.2 parolees within two miles. Thus, on average, parolees tend to locate closer to impacted service providers. Likewise, whereas there are 102.8 parolees near the average mental health provider, the service providers near the average parolee have 116.9 parolees within two miles.

<sup>6</sup> With a log-transformation, the coefficients of this model can be interpreted as percentage changes in the outcome measure. We also estimated models with the unlogged outcome and the results were substantively the same.

<sup>7</sup> We tested higher level polynomials and found no significant effects. Additionally, we also created a series of categorical measures of the age of parolees, and found a similar nonlinear effect. The age categories were: 1) less than or equal to 18 years of age; 2) 19-21 years of age; 3) 22-25 years; 4) 26-29 years; 5) 30-34 years; 6) 35-39 years; 7) 40-44 years; 8) 45-49 years; 9) 50-54 years; 10) 55-59 years; 11) 60 and older.

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<sup>8</sup> As Allison and Waterman (2002) discuss, the conditional fixed effects negative binomial regression of Hausman, Hall, and Griliches (1984) does not appropriately account for differences across units, as it only accounts for the difference in the distribution of the overdispersion across units, rather than accounting for the differences in the parameters.

<sup>9</sup> A reviewer suggested taking into account the demographic characteristics of the census tract in which the parolee resides. We chose not to adopt this interesting suggestion as it raises several serious analytic issues. First, our study differs from a traditional multilevel model in that we are not predicting an individual-level outcome with both individual- and tract-level measures (in which case multilevel models are frequently employed). Instead, since our outcome measure is the number of health service providers within a two-mile buffer of the parolee, this geographic area will almost certainly contain multiple census tracts (given that the typical census tract in 2000 is about 1.4 miles across, or 2 square miles). The tract in which the parolee resides generally only contains a portion of the geographic area contained in the two-mile buffer around the parolee, and some of the tract's geographic area will be outside this two-mile buffer in instances in which the tract's geographic area is somewhat larger than average. Second, simply computing the number of health service providers located in the tract in which the parolee resides has the geographic limitations we discussed in footnote 4. Third, another approach utilizes various interpolation techniques to construct the social context of the two-mile buffer around the parolee using Census data. However, a nontrivial assumption for such interpolation is that the characteristics of the geographic unit contained within the buffer (i.e., the census tract) are homogenous across the entire unit. To the extent that this assumption is not met, such an approach will introduce bias into the results. We therefore contend that our model provides a conceptually clear test of our research hypotheses and that the costs introduced by including such contextual measures do not outweigh any possible benefits to the analysis.

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<sup>10</sup> Although our analyses focused on the first address of parolees, in this sample, 50% did not change residences, 26% moved just once, 12% moved twice, and 12% moved more than twice during the study period (up to two years). We estimated ancillary models in which we included information for all addresses of parolees, and generally found substantively similar results to those presented here. One difference we found when accounting for multiple addresses was that sex offenders had no more of these health providers nearby than other parolees, suggesting that sex offenders' subsequent moves are taking them into neighborhoods with fewer health service providers nearby than their initial neighborhood upon release. Thus, whereas we focused here only on the first address of parolees under the concern that parolees would choose neighborhoods richer in such services in subsequent moves (a selection effect), it appears that sex offenders are actually moving into neighborhoods *poorer* in such services. An unexpected finding in these ancillary models was that the first address after release from prison placed parolees near more health service providers, implying that subsequent residential moves place parolees near *fewer* health services. This may suggest that parolees are pushed into less desirable neighborhoods, in terms of service resources, by residential mobility decisions over the course of their parole periods.

<sup>11</sup> This is calculated as follows: for African-Americans, there are on average 23.7% more of these health providers within two miles, but these providers, on average, have 65.5% more parolees nearby. Taking this ratio shows that the providers near African-Americans are 2.77 times as impacted as the advantage African-Americans have from more nearby health providers ( $.655 / .237 = 2.77$ ).

## Tables and Figures

Table 1. Summary statistics for measures used in analyses, California parolees released in 2005-06

	Mean	Std Dev.
African-American	28.3%	45.0%
Latino	32.2%	46.7%
Asian	0.7%	8.4%
Other race	3.7%	18.9%
Female	12.1%	32.7%
Age	34.9	9.9
Property offenses	0.320	0.673
Violent offenses	0.285	0.727
Days spent in CDCR institutions	1,114.1	1,194.7
Registered sex offender	6.8%	25.1%
<b><i>Outcome measures, types of service providers</i></b>		
Substance use	3.22	4.18
Mental health	4.78	5.95
General health	1.95	2.97
Average number of parolees within 2 miles of substance use provider	80.92	102.38
Average number of parolees within 2 miles of mental health provider	115.85	131.31
Average number of parolees within 2 miles of general health provider	41.50	55.35

*N = 57,107 person observations*



## Parolees' access to health services

Table 2. Outcomes of number of service providers within two miles of parolee and number of parolees within two miles of nearby service providers. Using characteristics of parolee as predictors

	Number of services within two miles			Potential demand: Number of parolees (logged) within two miles of services		
	Substance use	Mental health	General health	Substance use	Mental health	General health
Age (x 1000)	10.816 ** (7.42)	10.752 ** (6.59)	9.593 ** (5.27)	13.089 ** (6.80)	12.820 ** (7.14)	11.432 ** (5.54)
Age squared (x 1000)	0.229 ** (4.31)	0.233 ** (4.41)	0.238 ** (4.32)	0.316 ** (3.44)	0.361 ** (4.15)	0.346 ** (4.16)
Age cubed (x 1000)	-0.016 ** (-5.48)	-0.015 ** (-5.04)	-0.013 ** (-3.85)	-0.020 ** (-4.60)	-0.019 ** (-4.58)	-0.016 ** (-3.41)
African-American	0.278 ** (10.97)	0.286 ** (10.50)	0.146 ** (4.05)	0.792 ** (19.30)	0.834 ** (20.53)	0.339 ** (7.69)
Latino	0.093 ** (5.08)	0.108 ** (5.91)	0.141 ** (6.91)	0.296 ** (9.47)	0.367 ** (11.18)	0.287 ** (9.67)
Asian	0.070 (1.15)	0.048 (0.79)	0.106 (1.63)	0.127 (1.19)	0.060 (0.55)	0.197 † (1.86)
Other race	0.107 ** (3.65)	0.092 ** (3.11)	0.108 ** (3.49)	0.225 ** (4.32)	0.232 ** (4.25)	0.217 ** (4.41)
Female	0.057 * (2.30)	0.043 † (1.67)	0.050 (1.49)	0.158 ** (4.41)	0.144 ** (4.18)	0.060 (1.46)
Years in prison	0.007 ** (3.22)	0.007 ** (3.31)	0.005 † (1.82)	0.019 ** (4.95)	0.019 ** (5.17)	0.006 (1.58)
Violent offenses	-0.018 † (-1.93)	-0.020 * (-2.19)	-0.016 (-1.42)	-0.031 * (-2.08)	-0.030 * (-2.02)	-0.014 (-0.91)
Property offenses	-0.019 * (-2.34)	-0.020 * (-2.46)	-0.014 (-1.48)	-0.058 ** (-4.14)	-0.049 ** (-3.54)	-0.025 † (-1.90)
Sex offender	0.145 ** (3.40)	0.142 ** (3.35)	0.115 * (2.03)	0.137 * (2.01)	0.139 * (1.99)	0.085 (1.24)
Intercept	0.807 ** (13.33)	1.250 ** (18.23)	0.927 ** (11.96)	-0.128 (-0.54)	-0.065 (-0.24)	-1.909 ** (-4.74)
<b>R-squared</b>	0.035	0.025	0.043	0.155	0.162	0.111

\*\*  $p < .01$  (two-tail test), \*  $p < .05$  (two-tail test), †  $p < .10$  (two-tail test). Fixed effects (by county) negative binomial regression models. Standard errors corrected for clustering by parolee. T-values in parentheses

$N = 57,107$  person observations

Table 3. Outcomes of number of service providers within two miles of parolee and number of parolees within two miles of nearby service providers (potential demand). Allowing effects of parolee characteristics to vary over urban, suburban, and rural counties.

	(A)			(B)		
	Substance use providers			Mental health providers		
	Rural	Suburban	Urban	Rural	Suburban	Urban
African-American	0.289	0.095	0.319	0.337	0.090	0.330
Latino	0.266	0.032	0.112	0.270	0.012	0.136
Sex offender	0.099	0.020	0.185	0.106	0.005	0.187
	(C)			(D)		
	Substance use providers potential demand			Mental health providers potential demand		
	Rural	Suburban	Urban	Rural	Suburban	Urban
African-American	0.296	0.397	0.895	0.360	0.422	0.946
Latino	0.455	0.094	0.361	0.520	0.073	0.461
Sex offender	0.094	-0.041	0.197	0.089	-0.081	0.215

*Note: negative binomial regression models run separately on rural counties (< 50% urban), suburban counties (50 to 80% urban), and urban counties (> 80% urban). Models include all variables shown in Table 2. Only coefficients shown are those with significant differences across types of counties.*

*N = 57,107 person observations*

## Appendix

Table A1. Tract characteristics of first residence for California parolees in 2005-06, compared to the characteristics of their county of residence

	Census tract		County	
	Mean	Std. Dev	Mean	Std. Dev
Poverty rate	21.6	13.1	15.4	4.2
Median income	37,767	16,059	45,310	9,556
Unemployment rate	10.8	7.4	7.8	2.3
Percent single parent households	19.4	8.8	14.5	2.2
Average length of residence	9.1	2.8	9.4	0.7
Percent homeowners	48.7	22.9	57.4	7.7
Percent African American	10.7	14.8	6.6	3.5
Percent white	36.8	26.7	46.4	13.6
Percent Latino	40.6	24.4	33.5	11.7

*N = 57,107 person observations*